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(52) UK CL (Edition P)

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(56) Documents Cited

**GB 2317342 A GB 2205499 A WO 97/12641 A**  
**US 5297547 A US 4329983 A**

(58) Field of Search

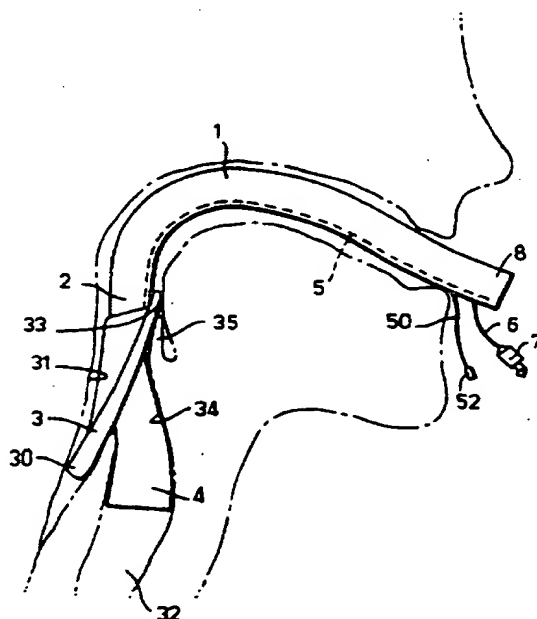
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(54) Abstract Title

**Laryngeal mask assembly**

(57) A laryngeal mask assembly has a tubular shaft 1 with a mask portion 30 formed by a resilient skirt towards its patient end 2, which seals with tissue in the region of the hypopharynx. An inflatable cuff 4, with several annular reinforcing members (42), projects axially at the patient end of the assembly into the laryngeal inlet 34. Towards its patient end, the cuff 4 has a flap (47) that normally closes the passage through the cuff and prevents entry of the epiglottis. A pull cord 50 attached with the flap (47) enables the flap to be pulled to one side, deflecting the epiglottis and opening the passage through the cuff 4. In a further embodiment, the cuff (4') is not inflatable.

Fig.1.



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Fig.1.

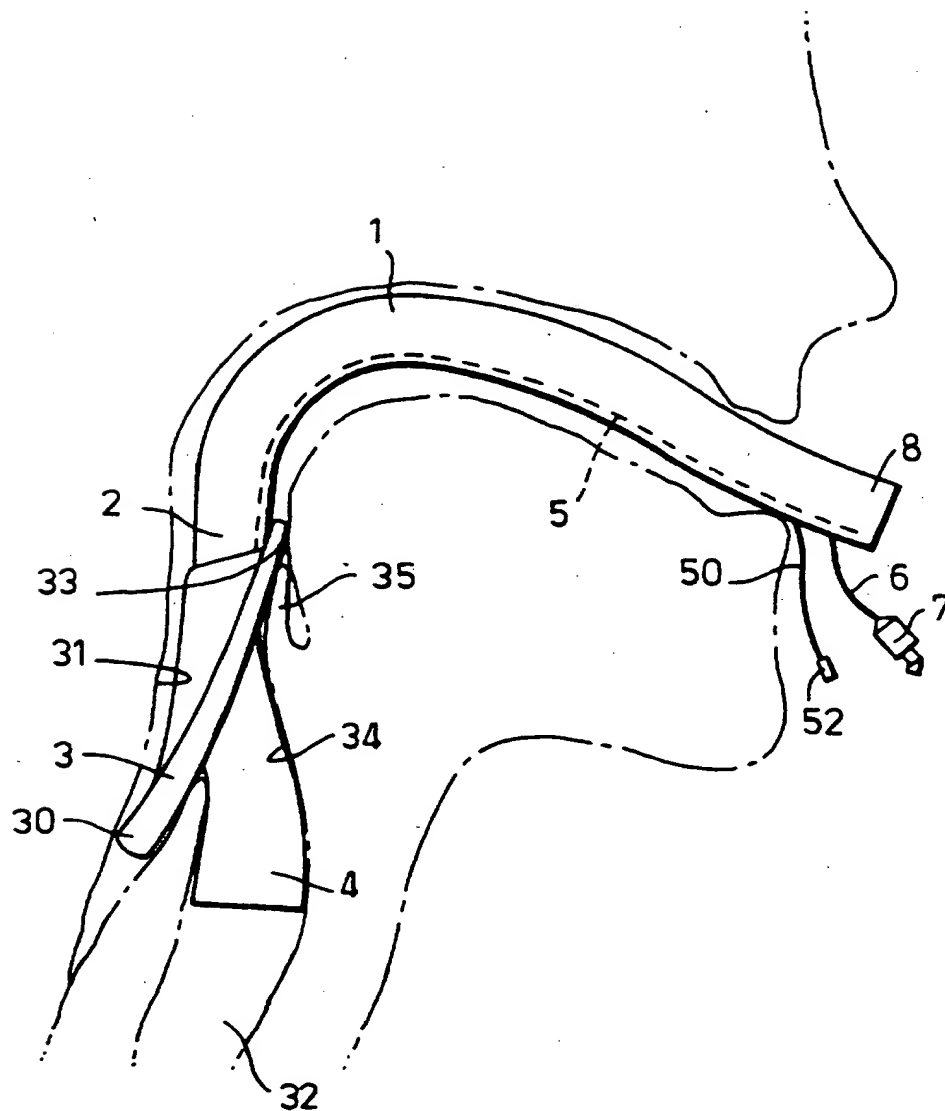


Fig.2A.

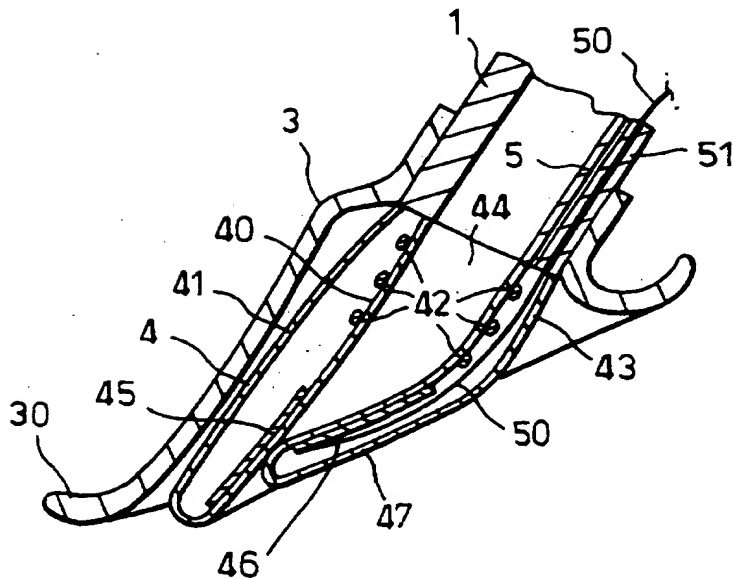


Fig.2B.

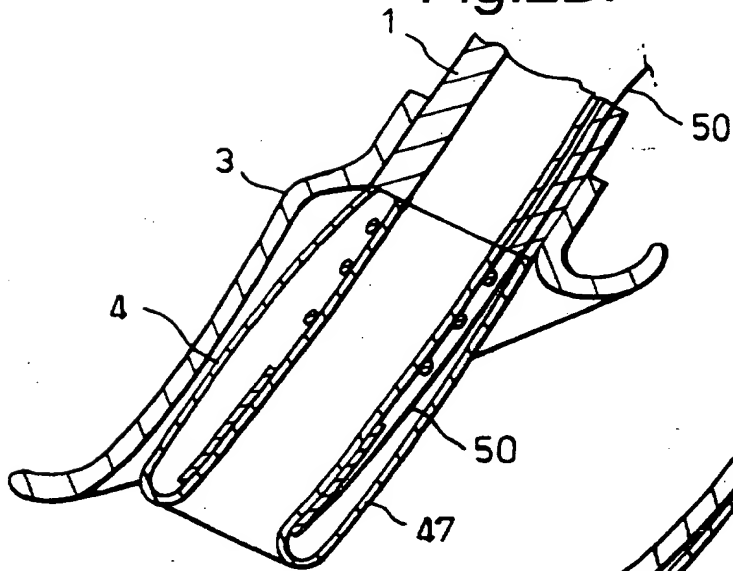


Fig.2C.

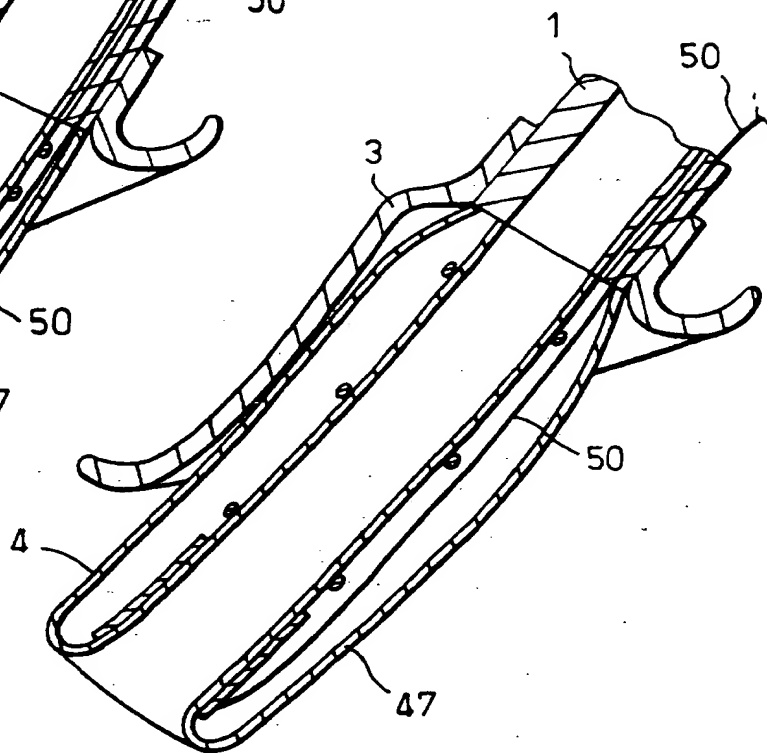


Fig.3A.

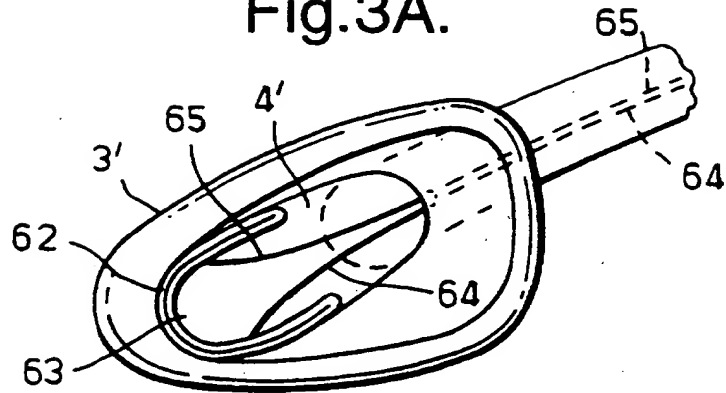


Fig.3B.

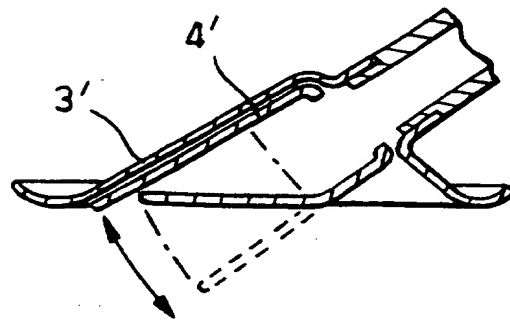


Fig.3C.

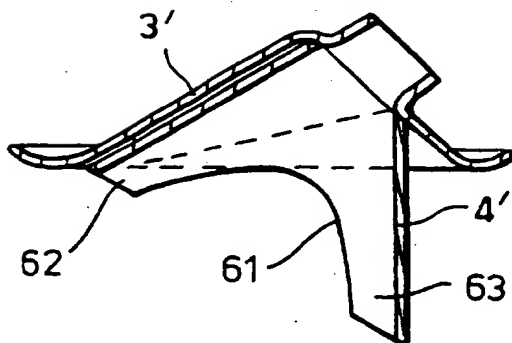
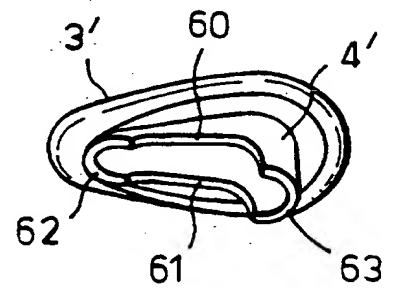


Fig.3D.



### Laryngeal Mask Assemblies

This invention relates to laryngeal mask assemblies

It is common practice to use an airway known as a laryngeal mask for the administration of anaesthetic and ventilation gases to a patient. These airways comprise a tube with an inflatable mask or cuff at one end, the tube being inserted in the patient's mouth so that one end is located in the hypopharynx and so that the mask forms a seal in this region with the surrounding tissue. Laryngeal masks are described in, for example, US 5355879, US 5305743, US 5297547, US 5282464, GB 2267034, US 5249571, US 5241956, US 5303697, GB 2249959, GB 2111394, EP 448878, US 4995388, GB 2205499, GB 2128561 and GB9603555.

Laryngeal masks have several advantages over endotracheal tubes, which are longer and seal with the trachea below the vocal folds.

It is an object of the present invention to provide an improved laryngeal mask assembly.

According to one aspect of the present invention there is provided a laryngeal mask assembly comprising a tubular shaft having a mask portion towards its patient end, the mask portion being adapted to seal with tissue in the region of the hypopharynx, the assembly additionally including an expansible tubular cuff member extending substantially axially of the tubular shaft beyond the mask portion into the laryngeal inlet.

The cuff member preferably includes a deflectable member at its patient end that, in one position, prevents entry of the epiglottis into the opening at the patient end of the assembly and, in another position, deflects the epiglottis away from the opening at the patient end of the assembly. The assembly may include a pull cord attached with the deflectable member by which the deflectable member can be moved from the one position to the other position.

According to another aspect of the present invention there is provided a laryngeal mask assembly comprising a tubular shaft having a mask portion towards its patient end, the mask portion being adapted to seal with tissue in the region of the hypopharynx, the assembly additionally including a cuff member that can be changed from a first state where it prevents entry of the epiglottis into the patient end of the assembly to a second state where it deflects the epiglottis away from the opening at the patient end of the assembly.

The mask portion is preferably a non-inflatable resilient skirt. The cuff member is preferably inflatable. Alternatively, the cuff member is a resilient funnel-shape member. The cuff member may include one and preferably a plurality of annular reinforcing members arranged to keep open a central passage through a part of the cuff member.

A laryngeal mask assembly according to the present invention, will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1

is a side elevation view of the laryngeal mask assembly in use;



- Figure 2A is an enlarged sectional side elevation view of the patient end of the mask assembly showing the laryngeal cuff before introduction;
- Figures 2B and 2C are enlarged sectional side elevation view of the patient end of the mask assembly showing the laryngeal cuff in an intermediate and expanded state respectively; and
- Figures 3A is a perspective view of the patient end of an alternative assembly before introduction;
- Figure 3B. is a sectional side elevation view of the assembly of Figure 3A before introduction;
- Figure 3C is a sectional side elevation view of the assembly as expanded after introduction; and
- Figure 3D is a perspective view of the patient end of the assembly as expanded after introduction.

With reference first to Figures 1 and 2, the laryngeal mask assembly has a tubular shaft 1 of a bendable plastics material, such as PVC, which is bent to conform to the anatomy

of the patient. At its patient end 2, the assembly has a laryngeal mask member 3 and an inflatable laryngeal cuff 4, which will be described in detail later. The interior of the laryngeal cuff 4 communicates with an inflation lumen 5 extending along the length of the shaft 1, within its wall, which connects to a small bore inflation line 6 terminated by a combined inflation indicator and connector 7. The machine end 8 of the assembly projects a short distance from the patient's mouth.

The laryngeal mask member may be of the conventional inflatable kind, such as described in GB 2205499, in which case it would communicate with a separate inflation line. As shown, however, in the present example, the mask 3 is non-inflatable and in the form of a thin, flexible, resilient skirt 30 of elliptical shape attached to the outside of the shaft 1 at its patient end 2. The peripheral shape of the mask 3 is chosen so that it conforms to and seals with tissue in the region of the hypopharynx 31, so as to form a seal around the circumference of the opening 33 of the laryngeal inlet 34.

The patient end 2 of the shaft 1 supports the laryngeal cuff 4, which projects axially beyond the patient end of the shaft. The cuff 4 is of cylindrical shape with an inner wall 40 and an outer wall 41. The inner wall 40 carries several annular reinforcing members 42 spaced from one another along a rear portion 43 of the cuff, which act to keep open a central passage 44 through the rear part of the cuff. Towards its forward end, the cuff 4 has two curved plates 45 and 46 diametrically opposite one another, which serve to stiffen the forward portion of the cuff. The forward end of the cuff 4 is formed, as shown in Figure 2A, so that its resilience urges a flap region 47, extending around approximately half the circumference of

the cuff, towards the opposite side of the cuff so that the forward end of the cuff lies approximately along the plane containing the forward surface of the skirt 30. It can be seen that, in this state, the opening to the forward end of the shaft 1 is closed.

The assembly also includes a pull cord 50 extending within the cuff 4 and attached at its forward end to the flap region 47. The cord 50 extends along the length of the assembly, through a passage 51 extending through the shaft 1. The rear end 52 of the cord 50 extends from the machine end of the assembly, as shown in Figure 1. The cord 50 is arranged so that, when it is pulled, it pulls the flap region 47 away from the opposite side of the cuff, as shown in Figure 2B. In this position, the length of the cuff 4 is such that it just projects beyond the forward, patient end of the mask 3.

The mask assembly is introduced in any of the conventional ways used with laryngeal masks, so that the mask 3 is located to extend around the opening 33 of the laryngeal inlet 34. The assembly is introduced with the cuff 4 in the state shown in Figure 2A, that is, with the flap region 47 covering the opening to the cuff. This prevents the epiglottis 35 entering the patient end of the assembly during insertion. The clinician then pulls the cord 50 so that the flap 47 swings down to the right, opening the passage through the assembly and displacing the epiglottis to one side, if this should be folded down across the patient end of the mask 3. This also causes the patient end 2 of the shaft and the laryngeal cuff 4 to project into the laryngeal inlet. The clinician then introduces a measured volume of air via the connector 7 into the cuff 4 so that it expands axially and radially into the laryngeal inlet 34. The cord 50

may be clipped in some way at its machine end, so that flap 47 remains open, or the inflation of the cuff with the introduced air may be sufficient by itself to keep the flap open.

When the cuff 4 is inflated, it extends both axially and radially outwards to a position shown in Figure 2C. In this position, the cuff 4 extends into the laryngeal inlet 34 but does not extend within the larynx 32 itself. The radial expansion of the cuff causes it to seal with tissue in the laryngeal inlet.

Because the laryngeal cuff 4 provides an effective seal, it is not essential that the seal provided by the laryngeal mask 3 be complete. The assembly of the present invention can provide an improved seal compared with conventional laryngeal masks and has the advantage of ensuring that the epiglottis does not present any obstruction.

Various modifications are possible. For example, the laryngeal cuff need not be expanded by positive air pressure but could be filled with a resilient material, such as a foam, and be reduced in volume for introduction or removal by a negative pressure, or some form of mechanical arrangement, such as pull cords. The mask need not seal around the laryngeal inlet but could seal in the pharyngeal region.

In another alternative arrangement, the assembly has a non-inflatable cuff that projects within the laryngeal inlet 34 but does not make a complete seal with it. Such an assembly is shown in Figures 3A to 3D. The assembly has a mask 3' of the same kind as shown in Figures 1 and 2 but, in place of the inflatable cuff 4 it has a cuff 4' formed of a resilient material,

which, in its natural state, as shown in Figures 3C and 3D, has the shape of a flat funnel. The cuff 4' is divided by two recesses 60 and 61 into two lateral portions 62 and 63. For introduction into the patient, one of the lateral portions 63 is inverted into the other 62, as shown in Figure 3A, so that the patient end of the cuff is closed and of semi-cylindrical shape. In this position, the cuff 4' does not project beyond the mask 3'. Two pull cords 64 and 65 are attached to the inverted portion 63 of the cuff 4' so that, once it is in position in the patient, the cords can be pulled, to open out the cuff to its natural shape shown in Figures 3B to 3D. This again causes the epiglottis 35 to be deflected out of the way, should it be located across the end of the mask 3'. The natural resilience of the cuff 4' urges the two portions 62 and 63 against opposite sides of the laryngeal inlet.

CLAIMS

1. A laryngeal mask assembly comprising a tubular shaft having a mask portion towards its patient end, the mask portion being adapted to seal with tissue in the region of the hypopharynx, wherein the assembly additionally includes an expansible tubular cuff member extending substantially axially of the tubular shaft beyond the mask portion into the laryngeal inlet.
2. A laryngeal mask assembly according to Claim 1, wherein the cuff member includes a deflectable member at its patient end that, in one position, prevents entry of the epiglottis into the opening at the patient end of the assembly and, in another position, deflects the epiglottis away from the opening at the patient end of the assembly.
3. A laryngeal mask assembly according to Claim 2, wherein the assembly includes a pull cord attached with said deflectable member by which said deflectable member can be moved from said one position to said other position.
4. A laryngeal mask assembly comprising a tubular shaft having a mask portion towards its patient end, the mask portion being adapted to seal with tissue in the region of the hypopharynx, wherein the assembly additionally includes a cuff member that can be changed from a first state where it prevents entry of the epiglottis into the patient end of the assembly to a second state where it

deflects the epiglottis away from the opening at the patient end of the assembly.

5. A laryngeal mask assembly according to any one of the preceding claims, wherein said mask portion is a non-inflatable resilient skirt.
6. A laryngeal mask assembly according to any one of the preceding claims, wherein the cuff member is inflatable.
7. A laryngeal mask assembly according to any one of Claims 1 to 5, wherein the cuff member is a resilient funnel-shape member.
8. A laryngeal mask assembly according to any one of the preceding claims, wherein the cuff member includes at least one annular reinforcing member arranged to keep open a central passage through a part of the cuff member.
9. A laryngeal mask assembly according to Claim 8, wherein the cuff member includes a plurality of said annular reinforcement members.
10. A laryngeal mask assembly substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

11. A laryngeal mask assembly substantially as hereinbefore described with reference to Figures 1 and 2 as modified by Figure 3 of the accompanying drawings.
12. Any novel and inventive feature or combination of features as hereinbefore described.





Application No: GB 9809150.7  
Claims searched: 1-3 and 5-11 in part

Examiner: Anwar Gilani  
Date of search: 10 August 1998

**Patents Act 1977**  
**Search Report under Section 17**

**Databases searched:**

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.P): A5R (RGAA, RGEX)

Int Cl (Ed.6): A61M 16/00, 16/04

Other: Online: WPI

**Documents considered to be relevant:**

Category	Identity of document and relevant passage	Relevant to claims
A,P	GB2317342 A (SMITHS INDUSTRIES) p.2 1.9-16, p.4 1.5-19	1
A	GB2205499 A (BRAIN) p.3 1.12-29, p.6 1.15-22	1
A	WO97/12641 A1 (BRAIN) p.3 1.21-25, p.9 1.34-p.10 1.16	1
A	US5297547 (BRAIN) col.1 1.28-61, col.3 1.21-39	1
A	US4329983 (FLETCHER) col.1 1.49-54, col.3 1.29-62	1-3

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